ceptivity in *Meriones unguiculatus* is a vaginal plug (MARSTON and CHANG 1965; NORRIS and ADAMS 1981). Due to the receptive stage, the interactions initiated by the females were not aggressive during the mating tests. The typical cellular pattern of metestrus was in some cases preceded by clustered cornified cells and isolated leukocytes. This has already been described in a previous study and classified as "estrus II" (NISHINO and TOTSUKAWA 1996). Our data do not confirm this suggestion, because our vaginal smear alike was always connected to metestrus behavior. A possible explanation for these contradictory results may be found in the diverging procedure, i.e., in

the cited investigation the animals were injected with pregnant mare serum gonadotropin and human chorionic gonadotropin. The elevated level of gonadotropin might have extended the estrus without affecting the vaginal epithelium. In the present study the females displayed no sexual behavior in that stage. The diestrus is generally defined as a "state of rest" between met- and preestrus, when the female was not fertilized. As described in an earlier study (ÅGREN and MEYERSON 1977) the behavior of the females is agonistic and biased towards avoidance. Our analysis of the estrus cycle revealed characteristic changes in mating behavior of female gerbils.

Acknowledgements

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Short communication

The Bolivian bamboo rat, *Dactylomys boliviensis* (Rodentia: Echimyidae), a new record for chromosome number in a mammal

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The family Echimyidae, a highly diverse group of rodents, occurs throughout most of Central and South America. There are 16 recent genera and about 70 living species (Woods 1993), however, new taxa continue to be described (e. g., Da Silva 1998; Patton et al. 2000). To date no comprehensive phylogenetic analysis is available for the group although great advances have been forthcoming (e. g., Lara et al. 1996; Patton et al. 2000). The group is highly diversified ecologically and has had a long evolutionary history in South America (Patterson and Pascual 1972; Woods 1982). Karyologically, less than half of the species have been analyzed but it is known that there is considerable variation in diploid (from 2n = 14 to 2n = 96) and fundamental numbers (from FNa = 18 to FNa = 144) (Tab. 1). One of the most specialized groups within the Echimyidae is the subfamily of bamboo rats (Dactylomyinae). Woods (1993) placed three genera in the subfamily Dactylomyinae; *Dactyloms*, *Kannabateomys*, and *Olallamys*. The biology and evolutionary relationships of the Dactylomyinae are poorly known, likely due to their rarity to collectors and subsequent scarcity in museum collections. What

is known is well summarized in Patton et al. (2000). Until recently (Aniskin 1993) no information on the chromosomal complement of any member of this group was available.

As part of a long-term survey of the mammals of Bolivia, many new and important records for the country were collected (Anderson 1997). In July of 1992 and May of 1996, we took a total of five specimens of *Dactylomys boliviensis* (Bolivian bamboo rat) from a locality in the Yungas of La Paz (Salazar et al. 1994). Here we report the karyotype of this species, the highest chromosomal number known in a mammal.

The individuals were located and collected at night in a dense stand of bamboo and secondary growth within the village of La Reserva (Departamento La Paz, Nor Yungas, La Reserva, elev. 840 m, 15° 44′ S, 67° 31′ W) by following their distinctive calls and eye shine. The village of La Reserva lies along Rio La Reserva, a small tributary of the Caranavi River. The village is at the bottom of a valley in the subtropical montane forest that covers most of the eastern Andean slopes between 15° and 17° S latitude in the Cordillera Oriental of Bolivia. The foothills at this elevation are cov-

Fig. 1. Standard karyotype of *Dactylomys boliviensis*.

ered with semi-deciduous vegetation inter-mingled with columnar cacti and bro-meliads. The forest is drier and sparser than at higher elevations. Compared to forests at higher and lower elevations, the trees are smaller, more highly branched, and most grow in open sun. The east facing slope above the river is steep, with much vegeta-tion, some secondary growth, and banana and tangerine cultivation. Palms and tree ferns are absent (Salazar et al. 1994).

Chromosomal preparations were obtained using the technique described in Anderson et al. (1987). Metaphase cells were photo-graphed and scored to determine the di-ploid (2n) and fundamental numbers (FNa). One of us (JLD) scored 5 slides per animal and over 20 spreads per slide to de-termine chromosome numbers. The analysis of the morphology of the chromosomes was based on 10 metaphase plates from three individuals. Nomenclature for chromosome morphology and fundamental number fol-lows Patton (1967).

Chromosome slides, tissue samples, and cell suspensions are deposited in the Division of Biological Materials, Museum of South-western Biology (MSB). Voucher speci-mens are deposited at MSB (MSB 68547, MSB 85627, NK 40537), the American Mu-seum of Natural History (AMNH 264887, 264884), and the Colección Boliviana de Fauna (CBF 2608), in La Paz, Bolivia.

The standard karyotype of *Dactylomys bo-liviensis* is highly asymmetrical, composed of 26 pairs of metacentric or sub-meta-centric autosomes and 32 pairs of acro-centric autosomes. The X chromosome is a large sub-metacentric and the Y chromo-some is a medium sub-metacentric. The re-sulting karyotype has a diploid count of 2n = 118 and FNa of 168 (Fig. 1). Chromo-

Table 1. Diploid (2n) and fundamental number (FN) for members of the family Echimyidae.

| Taxon	2n	FN	Reference
Dactylomys boliviensis	118	168	this report
Dactylomys dactylinus	94	144	ANISKIN (1993)
Echimys blainvillei	50	94	REIG (1989)
Echimys dasythrix	96	102	LIMA et al. (1998)
Echimys semivillosus	94	134	AGUILERA et al. (1998)
Echimys sp.	90	108	LIMA et al. (1998)
Echimys sp.	90	110	ANISKIN (1993)
Echimys sp.	90	112	REIG (1989)
Isothrix bistriata	60	116	PATTON et al. (2000)
Isothrix bistriata	60	120	LIMA et al. (1998)
Isothrix pagurus	22	38	PATTON and EMMONS (1985)
Isothrix sinnamariensis	28	42	VIE et al. (1996)
Makalata armata	70	120	LIMA et al. (1998)
Makalata didelphoides	66	106	LIMA et al. (1998)
Clyomys laticeps	34	60	REIG (1989)
Euryzygomatomys guiara	46	82	ANISKIN (1993)
Euryzygomatomys spinosus	46	92	REIG (1989)
Hoplomys gymnurus	46		ANISKIN (1993)
Lonchothrix emiliae	60	116	ANISKIN (1993)
Mesomys hispidus	60	120	LIMA et al. (1998)
Mesomys hispidus	60	116	PATTON et al. (2000)
Mesomys occultus	42	54	PATTON et al. (2000)
Proechimys albispinus	60	116	LEAL-MESQUITA et al. (1992)
Proechimys amphicoricus	26	44	REIG (1989)
Proechimys brevicauda	28–30	48–50	GARDNER and EMMONS (1984)
Proechimys canicollis	24	44	GARDNER and EMMONS (1984)
Proechimys cuvieri	28	46	MAIA and LANGGUTH (1993)
Proechimys decumanus	30	54	GARDNER and EMMONS (1984)
Proechimys echinothrix	32	69	PATTON et al. (2000)
Proechimys gardneri	40	56	PATTON et al. (2000)
Proechimys goeldii	24	44	PATTON et al. (2000)
Proechimys guiarae	44–50	72–76	GARDNER and EMMONS (1984)
Proechimys gularis	30	48	GARDNER and EMMONS (1984)
Proechimys guyannensis	40	54–56	GARDNER and EMMONS (1984)
Proechimys iheringi	62–65	117–124	REIG (1989)
Proechimys kulinae	34	52	PATTON et al. (2000)
Proechimys mincae	48	68	GARDNER and EMMONS (1984)
Proechimys oconnelli	32	52	GARDNER and EMMONS (1984)
Proechimys oris	30	52–56	GARDNER and EMMONS (1984)
Proechimys pattoni	40	56	PATTON et al. (2000)
Proechimys poliopus	42	76	GARDNER and EMMONS (1984)
Proechimys quadruplicatus	28	44	GARDNER and EMMONS (1984)
Proechimys semispinosus	30	50–54	GARDNER and EMMONS (1984)
Proechimys simonsi	32	58	GARDNER and EMMONS (1984)
Proechimys steerei	24	42	GARDNER and EMMONS (1984)
Proechimys trinitatus	62	80	GARDNER and EMMONS (1984)
Proechimys urichi	62	88	GARDNER and EMMONS (1984)
Proechimys yonenagae	54	104	LEAL-MESQUITA et al. (1992), ROCHA (1995)
Proechimys sp.	34	56	ANISKIN (1993)
Proechimys sp.	14–16	18	REIG (1989)
Proechimys sp. (Balta)	40	56	REIG (1989)
Proechimys sp. (Barinas)	62	74	GARDNER and EMMONS (1984)
Thricomys aperoides	26	48	LEAL-MESQUITA et al. (1993)
Thricomys aperoides	30	54	REIG (1989)
Thricomys aperoides	30	50	ANISKIN (1993)
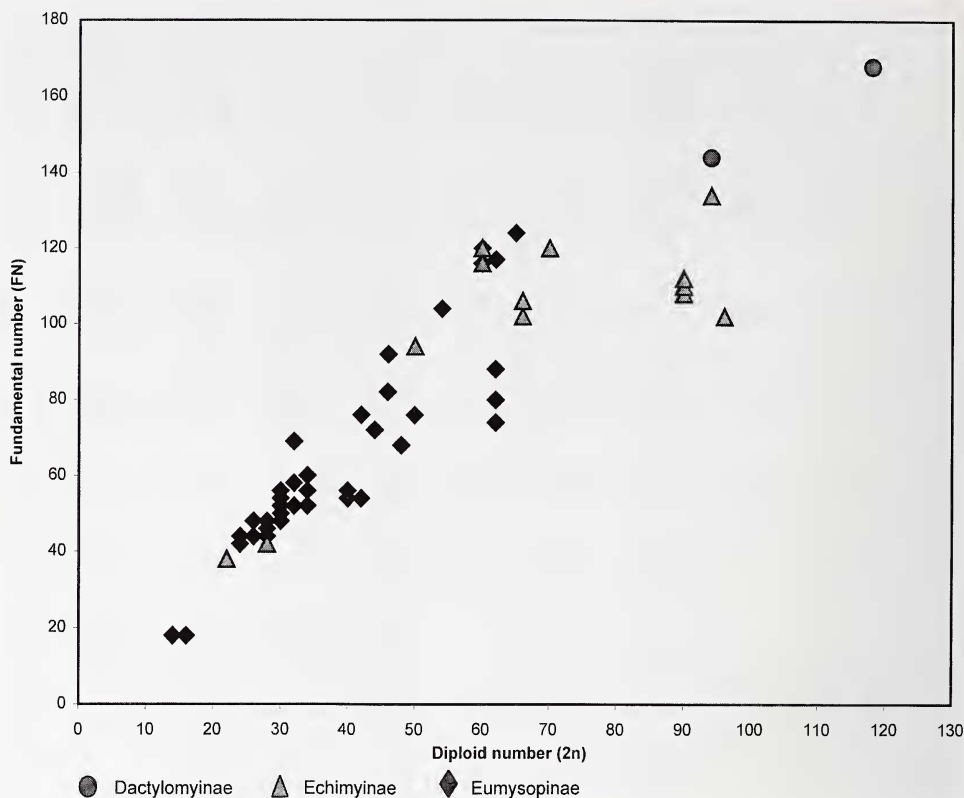
Fig. 2. Karyogram of known echimyid karyotypes.

some pair nine exhibits the characteristic satellite chromosome found in other echimyid rodents.

No chromosomal information is available for *Kannabateomys*, *Olallamys*, or *D. peruanus*. ANISKIN (1993) described the karyotype of *D. dactylinus* (2n = 94, Fn = 144) from the Loreto Department in Peru. The karyotype of *D. boliviensis* differs from that of *D. dactylinus* by the presence of one additional set of meta or sub-metacentric pairs, and 10 pairs of acrocentric chromosomes although comparisons are difficult due to the fact that ANISKIN (1993) did not identify sex chromosomes. At least 14 Robertsonian rearrangements would be necessary to transform the karyotype of one species into the other.

We compiled a list of all species of echimyid rodents for which data were available

(Tab. 1) and created a karyograph (IAMI and CROZIER 1980) based on chromosomal and fundamental numbers (Fig. 2). A definite pattern of subfamily grouping is clear where two species of *Dactylomys* assume the highest positions on the plot and the echimyine rodents (*Echimys, Makalata, Isothrix*) are positioned at an intermediate level (with the exception of *I. pagurus* and *I. sinnamariensis*). The most speciose and karyologically studied group is the Eumysopinae (represented in this sample by *Proechimys, Clyomys, Euryzygomatomys, Hoplomys, Lonchothrix, Mesomys,* and *Thrichomys*). For the most part these fall at the lower end of (Fig. 2). To date, no eumysopids have been found with a 2n > 65.

LIMA et al. (1998) proposed that Robertsonian rearrangements were more important in the evolution of the karyotype of arbo-